

REMARKS

Applicants request favorable consideration and allowance of the subject application in view of the preceding amendments and the following remarks.

Claims 2 and 7-14 having been previously canceled and 1, 5 and 6 having been indicated as allowable, Claims 3, 4 and 15-18 are presented for consideration. Claims 15 and 17 are independent. Claims 3, 15 and 17 have been amended to define still more clearly what Applicants regard as their invention, in terms which distinguish over the art of record. Support for these claims can be found in the application as originally filed. Therefore, no new matter has been added.

Claims 3 and 4 have been rejected under 35 U.S.C. § 112, second paragraph, as failing to point out and distinctly claim the subject matter the applicant regards as the invention. In particular, Claim 3 has been objected to in that it is unclear to which of “the second slit openings” in Claim 1 line 8 the phrase “said second slit opening” in Claim 3 is meant to refer to. As currently amended, Claim 3 recites “the width of each of said second slit openings” to clarify that each slit opening is referred to. Accordingly, it is believed that Claim 3 as currently amended and Claim 4 fully meet the requirements of 35 U.S.C. § 112, second paragraph.

Claims 15-18 have been rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent 6,171,730 (Kuroda et al. ‘730) or U.S. Patent 6,187,482 (Kuroda et al. ‘482) in view of U.S. Patent 6,236,033 (Ebbesen et al.) and/or the article “Sub-diffraction-limited patterning using evanescent near-field optical lithography”, (1999) Applied Physics Letters. (Alkai et al.). With regard to the claims as currently amended, this rejection is respectfully traversed.

Independent Claim 15 as currently amended is directed to a near-field photomask that forms a latent image on an exposure target by generated near-field light by receiving exposure light. The photomask has a light shield film with openings formed therein. The openings have first slit openings with two or more slit openings lengthened in a first direction and a second slit opening lengthened in a second direction. The second slit opening interlinks the first slit opening. The latent image is locally formed on the exposure target in a discrete region at which the second slit opening crosses the first slit openings by receiving polarized light having an electric field component parallel to the first direction.

Independent Claim 17 as currently amended is directed to a near-field photomask that forms a latent-dot-image on an exposure target by generated near-field light by receiving exposure light. The photomask has a light shield film with openings formed therein. The openings have first slit openings with two or more slit openings lengthening in a first direction and a second opening. The second opening interlinks the first slit openings and the latent-dot-image is locally formed in a discrete region on the exposure target at which the first slit opening crosses the second slit opening in response to the second opening by receiving polarized light having an electric field component parallel to the first direction.

In Applicants' view, Kuroda et al. '730 discloses an exposure arrangement that transfers a pattern to an object to be exposed by exposure to evanescent light using a mask having an aperture pattern having a width of 100 nm or less. The mask is arranged opposite to the object to be exposed, and pressure is applied to the mask arranged opposite to the object

from the side of the mask opposite to the surface facing the object to generate evanescent light under the pressure applied, to transfer the pattern of the mask to the object to be exposed by exposure to the evanescent light.

In Applicants' opinion, Kuroda et al. '482 discloses a mask used in an evanescent light exposure apparatus wherein the mask has a front side provided with minute aperture patterns and is disposed opposite an object to be exposed. The mask is irradiated with light from its back side, and the object is exposed to the minute aperture patterns, whereby the patterns are transferred thereto, by evanescent light that emerges from the minute aperture patterns. The outermost surface on the front side of the mask has an adsorption preventor.

Ebbesen et al., in Applicants' view, discloses an enhanced light transmission apparatus in which at least one aperture extends from a first surface to a second surface of a metal film. A periodic surface topography is provided on at least one of the first and second surface of the metal film. Light incident on one of the surfaces of the metal film interacts with a surface plasmon mode on at least one of the surfaces of the metal film thereby enhancing transmission of light through the at least one aperture in the metal film. The apparatus may have a single aperture or a plurality of periodically arranged apertures. Wavelength-selective optical filters, spatial optical filters, light collectors, near-field scanning optical microscope probes and photolithographic masks are provided.

Alkaisi et al., in Applicants' opinion, discloses sub-diffraction-limited patterning arrangements using evanescent near-field optical lithography in which patterning is performed at a resolution below the diffraction limit for line widths of 50nm and gratings with 140 nm period. In the arrangement, a conformable membrane mask is held in intimate contact with a

photoresist-coated substrate with a gap much less than the wavelength of the exposing illumination.

It is a feature of Claim 15 and 17 as currently amended that a latent image is formed on an exposure target in the discrete region at which first slit openings lengthened in a first direction cross a second slit opening in a second direction in response to the second slit opening by receiving polarized light having an electric field component parallel to the first direction. Kuroda et al. '730 and Kuroda et al. '482 may teach near field evanescent light exposure arrangements having a near field mask. As recognized by the Examiner, neither of these references specifically teach the feature of Claims 15 and 17 of a near-field mask having a light shielding film with two or more slit openings lengthening in a first direction that are interlinked by a second slit opening lengthening in a second direction combined with the inclusion of light illuminating means for illuminating polarized light along the first direction parallel to the first slit openings of the near-field mask in the near-field exposure apparatus. Further, Kuroda et al. '730 and Kuroda et al. '482 are devoid of any suggestion of the feature of Claims 15 and 17 of the local forming of a latent image on an exposure target in only the discrete region where a second slit opening in a second direction crosses first slit openings lengthened in a first direction..

Ebbesen et al. only teaches at lines 25-38 of column 15 with respect to Figs. 17A and 17B that slit shaped apertures 124a and 124b which form an H pattern in metal film 122 only provide an H shaped pattern 142 on substrate 140. The Ebbesen et al. structure, however, is limited to using an H pattern of slits in a metal film to form an H pattern on a substrate. There is, however, no teaching or suggestion in Ebbesen et al. of forming of locally forming a latent

image or a latent-dot-image in only the discrete region at which the second slit opening crosses the first slit openings by receiving polarized light having an electric field component parallel to the lengthening direction of the first slit openings such as shown in Figs. 1-4 of the present application. With regard to the cited combination of Kuroda et al., '730 or U.S. Patent 6,187,482 Kuroda et al., '482 in view of Ebbesen et al., the addition of Ebbesen et al.'s H pattern formation to Kuroda et al., '730 or Kuroda et al., '482 fails in any manner to suggest the feature of Claims 15 and 17 of local forming of a latent image on an exposure target in only the discrete region where a second slit opening crosses first slit openings.

Alkaisi et al. may teach the use of polarized light with an elongated aperture for sub-diffraction-limited patterning with evanescent near-field light but there is no disclosure of limiting a pattern to a discrete region nor is there any suggestion of forming a local latent image at the discrete region where an elongated slit opening in one direction crosses elongated slits in another direction. As a result, it is not seen that Alkaisi et al. suggests any arrangement in which a latent image is locally formed in only a discrete region where a second slit opening crosses with different direction first slit openings as in Claims 15 and 17.

As previously discussed, no combination of Kuroda et al., '730, Kuroda et al., '482 and Ebbesen et al. is seen as suggesting the feature of Claims 15 and 17 of local forming of a latent image on an exposure target in only the discrete region where a second slit opening crosses first slit openings. It is not seen that the addition of Alkaisi et al.'s application of polarized light to an elongated aperture such as in Fig. 2b to any combination of Kuroda et al., '730, Kudoda et al., '482 and Ebbesen et al. in any manner suggests the feature of Claims 15 and 17 relating to forming a latent image at discrete regions where the second slit opening

crosses first slit openings. It is therefore believed that Claims 15 and 17 as currently amended are completely distinguished from any combination of Kuroda et al. '730, Kudoda et al. '482, Ebbesen et al. and Alkaisi et al. and are allowable.

For the foregoing reasons, Applicants submit that the present invention, as recited in independent Claims 1, 15 and 17 is patentably defined over the cited art.

Dependent Claims 3, 4, 16 and 18 also should be deemed allowable, in their own right, for defining other patentable features of the present invention in addition to those recited in independent Claims 1, 15 and 17. Further individual consideration of these dependent claims is requested.

Applicants further submit that this Amendment After Final Action clearly places this application in condition for allowance. This Amendment was not earlier presented because Applicants believed that the prior Amendment placed the application in condition for allowance. Accordingly, entry of the instant Amendment, as an earnest attempt to advance prosecution and reduce the number of issues, is requested under 37 CFR 1.116.

Favorable reconsideration, withdrawal of the rejections set forth in the above-noted Office Action and an early Notice of Allowance are also requested.

Applicants also request that the Examiner contact their undersigned representative should any matters be deemed outstanding precluding allowance of this application.

Applicants' attorney, Steven E. Warner, may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below-listed address.

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